one of these proportions must cause a corresponding change in one or all of the above conditions.

Thus, let there be a stream which in flood contains 5 per cent. by weight of solid matter, and let it be 8 ft. deep, discharging 50,000 cubic feet a second, with a mean velocity of $7\frac{1}{2}$ ft. a second—the breadth of this stream would be $\frac{50{,}000}{8\times7{\cdot}5}=833\frac{1}{3}$. To add one-fourth to the discharge of this stream of pure water would increase the discharge from 50,000 to 62,500 cubic feet a second, and the proportion of solid matter, instead of being 5 per cent., would be only 4 per cent. But, by the example before given, a depth approaching 9 ft. instead of 8 ft. would be the natural depth, so the bed would be lowered 1 ft., and the breadth would only be increased $\frac{12{,}500}{2\times9\times7\frac{1}{2}}=92$ ft., instead of having to give an increase of one-fourth more, or $\frac{833}{4}=208$ ft., and still keep matters much as they are found in nature.

So in bridging such a stream the whole additional length of viaduct would be only 92 ft., or 116 ft. would be saved by simply sinking the foundations 1 ft. more. But as water rolls rather than slides, and never flows in straight lines, the shape of the section of a stream can be changed at pleasure; so the depth may be increased without much danger by decreasing the breadth. Taking, then, the same stream which it was proposed to make $833+92=925$ ft. broad by 9 ft. deep, suppose the mean depth be made 15 ft., this increase of depth would decrease the transporting power, while at the same time the velocity would also be increased; and suppose it to be now 10 ft. a second, instead of $7\frac{1}{2}$ ft., and with a depth of 15 ft. with such a velocity only 4 per cent. of solid matter could be held in suspension, and the waterway would be $\frac{62{,}500}{15\times10}=416\frac{2}{3}$ ft. broad instead of 925 ft., or less than one-half. That is, by adding 8 ft. to the general depth of a stream where the river discharges 50,000 cubic feet a second in the main channel, and 12,500 cubic feet a second of inundation water, which is comparatively free of silt, the whole volume or 62,500 cubic feet could be passed through a bridge only half the breadth of the original stream, which was 833 ft. broad. So the whole question reduces itself now into one of cost.

The question is whether it be cheaper to sink the foundations an extra 8 or 10 ft., or to double the length of viaduct. By the use of the sand-pump foundations can now be sunk through sand at a very moderate cost; so it is believed that the extra sinking would not involve anything like the cost of the shallower foundations for the bridge built on the extended plan; thus the whole cost of the superstructure and extra girders could be saved—that is speaking approximately. In such a case the bridge built on this deep foundation principle could be built at nearly half the cost of the old plan; but to guard against accidents, and scooping out to excessive depths, it would appear that at least one-third may be saved by building bridges on this principle; while the river, by having a deep channel under the bridge, could be kept in better control than by the present extended method, as it would not have such a tendency to desert its course, but would always keep to the deep channel.

Several other examples may be brought forward to illustrate the practical advantages that a better knowledge of the action of flowing water would be sure to confer on science and hydraulic engineering; but it is hoped that the foregoing will assist in bringing the importance of the subject more prominently forward. When once the subject is properly discussed I am convinced its importance will be manifested.

T. LOGIN

SOCIETIES AND ACADEMIES

LONDON

Royal Society, May 19.—"Experiments on the Effects of Alcohol (*Ethyl Alcohol*) on the Human Body." By E. A. Parkes, M.D., F.R.S., Professor of Hygiene in the Army Medical School, and Count Cyprian Wollowicz, M.D., assistant-surgeon, Army Medical Staff.

"On Deep-sea Thermometers." By Staff-Commander John E. Davis, R.N. Communicated by Captain Richards, R.N., Hydrographer of the Admiralty. The results of thermometric observations at great depths in the ocean not being of a satisfactory nature, the attention of the hydrographer of the navy was directed to the defects in the construction of the Six's self-registering thermometers then in use, and also to the want of knowledge of the effects of compression on the bulb; and as it was known that a delicate thermometer was affected *in vacuo*, it was natural to suppose that an opposite effect would be had by placing them under pressure, and particularly such as they would be subjected to at great depths. Several thermometers, of a superior construction, were made by different makers, and permission was granted to make experiments by pressure in a hydraulic press; but much delay was caused by not being able to obtain a press suitable to the requirements, until Mr. Casella, the optician, had a testing-apparatus constructed at his own expense, and the experiments were commenced. Previous to the experiments being made, Dr. W. A. Miller, V.P.R.S., proposed, or rather revived, a mode of protecting the bulb from compression by encasing the full bulb in glass, the space between the case and the bulb being nearly filled with alcohol.* A wrought-iron bottle had been made to contain a thermometer, for the purpose of comparison with those subjected to compression; but it failed, and finally burst under great compression; it proved, however, of but little consequence, as those designed by Dr. Miller showed so little difference under pressure that they were at once accepted as standards. Two series of experiments were then most carefully made, at pressures equal to depths of 250, 500, &c., to 2,500 fathoms, the results of which satisfactorily proved that the strongest made unprotected thermometers were liable to considerable error, and therefore that all previous observations made with such instruments were incorrect. Experiments were also made in the testing-apparatus with Sir Wm. Thomson's enclosed thermometers, to ascertain the calorific effect produced by the sudden compression of water, in order to find what error, if any, was due to compression in the Miller pattern: an error was proved to exist, but small, amounting to no more than 1°·4 under a pressure of 3 tons to the square inch. The dredging cruise of the *Porcupine* afforded an opportunity of comparing the results of the experiments made in the hydraulic testing apparatus, with actual observation in the ocean, and a most careful series of observations were obtained by Staff-Commander E. K. Calver at depths corresponding to the pressure applied in the testing apparatus; the result was that, although there was a difference in the curves drawn from the two modes of observation, still the general effect was the same, and the *means* of the two were identical. From these experiments and observations a scale has been made by which observations made by thermometers of similar construction to those with unprotected bulbs can be corrected and utilised, while it is proposed that by means of observations made with the Miller pattern in the positions and at the same depths at which observations have been made with instruments not now procurable for actual experiment, to form a scale for correcting all observations made with that particular type. In conclusion, it is suggested that to avoid error from the unsatisfactory working of the steel indices, which, from mechanical difficulties in their construction, cannot always be depended on, two instruments should be sent down for every observation; and although their occasional disagreement of record may raise a doubt, a little experience will enable the observer to detect the faulty indicator, while their agreement will create confidence.

London Mathematical Society, May 12.—Prof. Cayley, president, in the chair. The Hon. Sir J. Cockle, Chief Justice of Queensland, was proposed for election.—The President (Mr.

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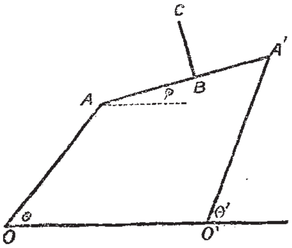
* *Vide* Proceedings of the Royal Society, vol. xvii. No. 113, June 17, 1869.

Spottiswoode, V.P., having taken the chair) gave an account of his paper "On the Mechanical Description of a nodal bicircular Quartic." Take a quadrilateral OAA′O′, in which the adjacent



sides OA, AA′ are equal to each other, and the other two adjacent sides OO′, O′A′ are also equal to each other. O, O′ are fixed points, and we have thus a link, AA′, the extremities of which are connected with the radii OA, O′A′, respectively, and consequently describe circles about the centres O, O′ respectively, the radius OA of the one circle being equal to the length AA′ of the link, and the radius O′A′ of the other circle being equal to the distance OO′ of the centres. The theorem is that any point C rigidly connected with the link AA′ describes a nodal bicircular Quartic; that is, a quartic curve with three nodes, two of the nodes being the circular points at infinity. Any such curve is the inverse of a conic, and it is also the antipode of a conic. For the analytical investigation, the origin is taken at O, the axis of x in the direction OO′, and the axis of y at right angles thereto, upwards from O. The inclinations of OA, AA′, O′A′ to the axis Ox are taken to be θ, ϕ, θ' respectively. Also write OA = AA′ = a, AB = b, BC = c, OO′ = O′A′ = a^1, and make $m = \frac{a^1 - a}{a^1 + a}$ then we have for the locus of C—

$$x = a \cos\theta + b\cos\phi - c\sin\phi$$
$$y = a\sin\theta + b\sin\phi + c\cos\phi;$$

since $\theta^1 = \theta + \phi$. Also we have $\tan\frac{\theta}{2} \tan\frac{\phi}{2} = m$; whence writing $\tan\frac{\theta}{2} = u$, we have $\tan\frac{\phi}{2} = \frac{m}{u}$ and the equation to the locus may be written—

$$x = -a\frac{u^2 - 1}{u^2 + 1} + b\frac{u^2 - m^2}{u^2 + m^2} - c\frac{2mu}{u^2 + m^2}$$
$$y = a\frac{2u}{u^2 + 1} + b\frac{2mu}{u^2 + m^2} + c\frac{u^2 - m^2}{u^2 + m^2};$$

which equations show that the locus is a bicircular quartic. The author then proceeds to show the existence of a third node, to express the locus as the inverse of a conic, and to exhibit it as the antipode of a conic. In the discussion on the paper Mr. Roberts gave some additional results bearing on the subject; and Mr. Spottiswoode stated that he recognised many of the curves (exhibited by Messrs. Cayley and Roberts) as having come under his notice in the course of experiments he had recently made with elastic strings.

Mr. Roberts then read his paper "On the Ovals of Des Cartes." It will suffice in this notice to give the heads under which the author treated the subject. On the polar equation and its interpretation; on the description of the curves by the transformation of a circle; on certain systems of the curves; on the normals; properties deducible from the general interpretation of the polar equation. Under the last head Mr. Roberts stated some interesting results: the sum of the areas of the Ovals—that is to say, in an obvious sense, the area of the Cartesian is equal to twice the area of the circle whose centre is at the triple focus, and which passes through the points of contact of the double tangent; the lengths of the ovals of a Cartesian are expressed by Zyzygetic relations between two elliptic quadrants; the difference of the lengths of the loops of a nodal Limaçon is four times the distance between the vertices.—Dr. Henrici exhibited a plaster cast of the surface, $xyz - \left(\frac{3}{7}\right)^3 \left(x + y + z - 1\right)^3 = 0$.

Royal Astronomical Society, May 13.—W. Lassell, F.R.S., President of the Society, in the chair. Thirty-one presents were announced, and the thanks of the society were voted to the respective donors. Prof. Selwyn read a communication from Sir John Herschel, referring to a chart in which the sun's spots observed by Mr. Carrington during his long study of the sun have been referred to their proper solar longitude and latitude. Sir John Herschel's object in preparing this chart was to determine what signs there are that any particular portions of the sun within the sun-spot latitude are more liable than others to be the scene of spot-formation. He found very few signs of any such arrangement. Mr. Proctor remarked that Sir John Herschel's communication seemed to dispose effectually of Prof. Kirkwood's recently propounded theory in explanation of the periodicity of sun-spots.—Papers on the occultation of Saturn, as observed by Messrs. Talmage, Joynson, and Captain Noble, were then read. Captain Noble remarked on the singularly clear definition of Saturn, "right up to the moon's limb," as being strikingly opposed to the theory brought forward by Mr. Watson at the last meeting of the society.—A paper by Mr. Penrose, on the Sun-spots recently seen, led to some controversy about the real nature of the spots. Mr. Howlett dwelt on the exaggerated character of the saucer-shaped depressions usually shown in text-books of astronomy. Mr. De La Rue mentioned the preponderance of evidence in favour of the spots being depressions. The Astronomer Royal also spoke in favour of this view. Mr. Lockyer dwelt on the evidence bearing on the subject derived from his method of detailed spectroscopic examination, and mentioned the interesting circumstance that so far as his spectroscopic observations had hitherto gone, it seemed almost as though the depressions were shallower now the spot period was nearly at its maximum than they were a year and a half ago. The Astronomer Royal expressed his admiration of the persistence and patience with which Mr. Lockyer had continued his solar observations, and stated his belief that in the course of the next two or three years we should gain much more new knowledge from this application of spectroscopic analysis to the sun.—At the President's request, Mr. Airy then referred to the expedition to be made to observe the eclipse of December next. He stated that the names of about sixty volunteers had been received. According to present arrangements, as many as twenty-six would be wanted at each station for general, spectroscopic, polariscopic, and photographic work. He expressed his anxiety that the observers who were to take part in the observations on the polarisation of the corona's light should understand their work, and clearly recognise—1st, what polarisation is; 2nd, what polarisation in a plane means; and, 3rd, when light *is* polarised in a plane how to recognise that plane. Mr. De La Rue spoke very favourably of the list of volunteers, saying that it included just those classes of observers which were really wanted. It was mentioned that the Poet Laureate had volunteered; and, in answer to a question by Prof. Grant, that good draughtsmen would accompany the expedition.—A paper by Mr. Lynn, on a star in Ursa Major, which has a very large proper motion, according to the researches of Argelander, was then read.—Mr. Proctor read a paper, "On the Resolvability of Star-groups regarded as a Test of Distance," dwelling on the evidence we have of variety of constitution as at least equally available to explain differences of resolvability as variety of distance can be. Mr. Stone said he thought Mr. Proctor exaggerated the theory of uniformity of stellar distribution; in reality, astronomers regarded the existence of very various degrees of real magnitude among stars as not only possible but probable, or even certain. Mr. Proctor said he was fully aware of that, and his views touched on quite a different matter. What he pointed to as wrong in accepted theories was that those theories failed to recognise the existence of definite aggregations of stars, in streams, clusters, groups, and so on, showing all degrees of richness of aggregation, &c.—Mr. Williams then described some antique telescopes of Campani's construction, amazingly long, with object-glasses varying apparently from about half an inch to an inch in diameter.

Zoological Society, May 12.—Prof. Newton, vice-president, in the chair. The secretary read some notes on the principal additions to the Society's menagerie during the month of April, and called particular attention to a Vulturine Guinea-fowl (*Numida vulturina*), presented by Dr. John Kirk, C.M.Z.S., being the first living specimen of this rare species received in England.—A communication was read from Dr. R. O. Cunningham, C.M.Z.S., on some peculiarities in the anatomy of three kingfishers, *Ceryle stellata*, *Dacelo gigas*, and *Alcedo ispida*.—A communication was read from Mr. George Gulliver, F.Z.S., on the taxonomic characters afforded by the muscular sheath of the œsophagus in sauropsida and other vertebrates.—Mr. R. B. Sharpe read a paper containing a full account of the swallows

(*Hirundinidæ*) of Africa, and pointed out their characters and geographical distribution. Particular attention was drawn to the affinities of the African *Hirundinidæ* with those of the New World, and also to the representation of various species by smaller races or sub-species throughout the Æthiopian region. Thirty-eight species of swallows were enumerated, of which number thirty were stated to be peculiar to the continent of Africa, and two to Madagascar and the adjacent islands. Two species only were common to India and Africa, and the remaining four were migratory throughout the Palæarctic and Æthiopian regions.—Dr. O. Finsch, C.M.Z.S., communicated the description of a new species of penguin in the collection of the Counts Turati, of Milan, which he proposed to call *Dasyrhamphus herculis*.—Messrs. P. L. Sclater and O. Salvin read descriptions of seven new species of birds collected by Dr. Habel during a recent expedition to the Galapagos Islands. These new species were mostly from Bindloes Island and Abingdon Island, which had not been visited by former explorers, and belonged principally to a peculiar group of *Fringillidæ*, containing *Geospiza* and its allied forms, which is characteristic of the Galapagoan Archipelago.—Mr. P. L. Sclater, F.R.S., read a paper on some new or little known species of South American birds, amongst which was a new woodpecker, proposed to be called *Melanerpes ulcher*, from New Granada.—Prof. Flower, F.R.S., communicated some additional notes on the specimen of the common fin whale (*Physalus antiquorum*) recently stranded in Langston Harbour.—Prof. Newton read a paper "on *Cricetus nigricans* as an European species," and exhibited a specimen of this mammal which had been lately killed in Bulgaria by Mr. T. E. Buckley, F.Z.S., and had been presented by him to the Cambridge Museum.

LEEDS

Philosophical and Literary Society, May 3.—At the annual meeting, being the close of the fiftieth session of the Leeds Philosophical and Literary Society—Dr. Heaton, the retiring president, in the chair—it was announced that the following gentlemen had been elected as officers, council, and members for 1870-71 :—President, John Deakin Heaton, M.D., F.R.C.P. ; Vice-Presidents, C. Chadwick, M.D., F.R.C.P., Thomas Nunneley, F.R.C.S. ; Treasurer, Henry Oxley ; Honorary Secretaries, Thomas Wilson, M.A., Richard Reynolds, F.C.S. ; Honorary Curator in Geology, J. G. Marshall, F.G.S. ; Honorary Curators in Zoology, Edward Atkinson, F.L.S., T. C. Allbutt, M.A., M.D., F.L.S., F.S.A. ; Honorary Curator in Ethnology and Works of Art, &c., Thomas Nunneley, F.R.C.S.; Honorary Librarian, John Deakin Heaton, M.D., F.R.C.P. The above officers, and the following gentlemen, compose the Council :—John Edwin Eddison, M.D., E. Filliter, M. Inst. C.E., F.G.S., T. M. Greenhow, M.D., Joshua Ingham Ikin, F.R.C.S., Rev. J. H. M'Cheane, M.A., John Manning ; T. W. Stansfeld, Rev. H. Temple, William Sykes Ward, F.C.S., Rev. Canon Woodford, D.D., General Curator and Assistant Secretary, Henry Denny, A.L.S.

PARIS

Academy of Sciences, May 16.—The following mathematical papers were read :—Researches on pencils of right lines and normals, containing a new exposition of the theory of the curvature of surfaces, by M. A. Mannheim, communicated by M. Bertrand ; a note on a peculiar property of the cassinoid with 3 foci, $p^6 - 2\,mp^3 \cos 3\,\theta = \pm 1$, by M. Allegret ; and a note on the solution of the problem consisting in finding three whole numbers, such that the square of the one shall equal the sum of the squares of the other two. M. Bertrand also presented a report on a memoir by M. Moutard on the theory of partial differential equations of the second order.—M. Lecoq de Boisbaudran presented some remarks on the spectra of nitrogen, in which, after noticing his observations on this subject, he concluded that the changes of the spectra of this, and probably of other bodies, depend upon variations of temperature rather than of pressure, a circumstance which ought to lead to great caution in the astronomical application of spectrum analysis.—M. Regnault presented a note on the maximum of density and the temperature of congelation of solutions of alcohol in water, by M. F. Rossetti. These temperatures decrease in proportion to the amount of alcohol in solution.—M. Leray communicated a theory of the elasticity of media deduced from the principle that equal currents crossing in all directions exist in the midst of ether when not influenced by surrounding bodies ; and M. Delaurier presented a description of a battery for ringing telegraphic bells.—A communication from Father Secchi, containing the rectification of a numerical error in his last paper, was read, and in connection therewith M. Fizeau communicated some remarks on the displacement of the spectral rays by the movements of the luminous body or of the observer. A memoir on the theory of the tides, by M. Roumiantzoff, was read ; also a note by M. Trémaux on some questions relating to the movements of the planets.—M. Guyon presented a note on a meteorological observation made by the washerwomen of the south coast of Spain. The observation was that with a southerly wind linen put out to dry always acquires a yellow colour ; the author accounted for it by assuming that this coloration is due to impalpable dust conveyed from the African deserts.—M. A. Wurtz described a process for obtaining solid cresole, and some curious properties possessed by that body.—M. F. M. Raoult communicated a note on the composition of the gas of the burning spring of Saint Barthélemy (Isère) It consisted chiefly of marsh gas, 98·81 per cent. by volume, with small quantities of carbonic acid, nitrogen, and oxygen probably accidentally mixed with it.—M. Guyot presented a note on the examination of ammonia and nitric acid by means of rosolic acid and bromomercurate of potash.—M. Belgrand communicated a general account of the contents of his great work on the basin of Paris in prehistoric times, which has lately been published by the municipal administration of Paris.—M. Farez recommended the employment of silicate of potash for the purpose of giving solidity and cohesion to friable fossil bones.—M. Brongniart presented a report on a memoir by M. B. Renault, on some silicified plants of the neighbourhood of Autun.—A note was read from M. Marey, admitting that Dr. Pettigrew had the priority over him with regard to the figure of 8 described by the wing of an insect during flight ; and M. A. Dumeril presented a note by M. S. Legouis on the pancreas of the osseous fishes and the nature of the vessels discovered by Weber. The author described three forms of pancreas occurring in osseous fishes, which he called the *disseminated*, *diffused*, and *massive* pancreas ; the vessels discovered by Weber are the excretory ducts of the first two forms. The Plagiostomi have a pancreas resembling that of the higher animals.—A note from M. Didierjean was read, calling attention to the fact that milk is a preservative from the poisonous effects produced by lead upon the workmen who are engaged in the preparation of its compounds.—M. E. Decaisne presented a note on the use of the sewing machine and its influence on the health of workwomen. He considers that the ill effects of working with the sewing machine have been greatly exaggerated, and that the health of women working with the machine is quite as good as that of needlewomen.

BERLIN

German Chemical Society, April 25.—H. Limpricht published a paper on oxyde of toluylene, to which he ascribes the formula $C\,H_2\,O\,C\,(C_6\,H_5)_2$.—M. Topsoï sent in a paper on preparing concentrated bromhydric acid, and a table on the boiling points of hydrobromic acids of different concentration.—A. Claus reports on the constitution of acroleïne, looked upon by Kolbe as an acetone, on account of its transformation by hydrogen into isopropylic acid. This Prof. Claus denies to be the case ; the alcohol obtained forming no acetone by oxidation.—W. Henneberg has found a source of error in using Pettenkofer's apparatus for determining the products of respiration ; the respiration of people approaching the apparatus influencing the amount of carbonic acid.—H. Schiff has found that acetic acid and oil of bitter almonds form cinnamic acid when treated with a minute quantity of HCl or Zn Cl_2. A larger quantity of these substances transforms the acid into metastyrol.—A. Oppenheim recommends the action of bibromide of copper for transforming organic iodides into bromides. With an alcoholic solution of this salt and iodide of allyle, the transformation is instantaneous, protoiodide of copper being precipitated at ordinary temperatures. An aqueous solution acts in the same way at a higher temperature. By the transformation of the bibromide into the protoiodide of copper, however, bromine is liberated, which will combine with non-saturated bromides. The method is, therefore, only applicable to saturated compounds.—C. Rammelsberg reported on isomorphous mixtures of selenium and sulphur.

May 9.—V. Meyer, in order to decide whether the hydrate of chloral is a molecular combination—thus, $C\,Cl_3 - C = O\,H + H_2O$—or whether the water enters into the atomic constitution of the body—thus, $C\,Cl_3 - C\,H\,(O\,H)_2$—has tried its action on chloride of acetyl. H_2O is thereby separated, and one molecule of chloride of acetyle takes its place. The first supposition, therefore, appears the more probable of the two.—P. Groth has entered into a long series of important and difficult researches to investigate the connection between the chemical constitution and crystalline form of organic bodies. He communicates his first results, founded on his measurement of the form of benzol during the great cold of last winter, and comparing with it the forms of benzolic derivatives, in which one or more hydrogen are replaced by O H, N O_2, or Cl. He has come to the conclusion that, by these substitutions, *the numeric relations of two axes remain intact, the third axis only increasing or decreasing with the chemical substitution* The influence thus exercised by certain elements or groups taking the place of hydrogen, he calls their *morphotropic* power. The morphotropic power of chlorine appears far greater than that of N O_2 or of O H. The morphotropic changes, however, depend likewise on the position the element or group occupies in the molecule, and on the crystallographic system of the primary substance. The author has also investigated certain combinations of naphthalene in the same sense. They bear out the law quoted above. For the conclusions drawn from these highly interesting results we must refer to the original paper.—M. Lex has found that phenol mixed with nitrite of potassium and a reducing substance (such as sugar and lime, or hydrochloric acid and zinc), and then exposed to the air, or the oxidising action of chloride of lime, gives rise to a blue colour, much like indigo, but very unstable.—A. W. Hofmann reported on the curious researches of Prof. Church on the red colouring matter of the feathers of the Turacon.—C. Rammelsberg has analysed Indian steel, or wootz, without finding in it a trace of aluminium.—M. Topsöe has analysed platinic acid and platinate of barium, to which he gives the formula: $Pt\ O_2,\ 2\ H_2\ O$ and $Ba\ Pt\ O_3 + 3\ H_2O$ respectively.—M. Clemenks, by treating the impure choride of pyroracemic acid with alcohol and with ammonia, has obtained the corresponding ether and amide.—MM. Kékulé and Quinke report on some reactions of metaldehyde and of paraldehyde.—M. Czumpelik has prepared the cyanide of nitrobenzyle and of amidobenzyle, and some derivatives of cuminic and of oxycuminic acids. The same author, by introducing one atom of chlorine into cymol, and treating the compound with acetate of potassium, obtained the corresponding organic acetate. —Mr. Buchanan, from Glasgow, has studied the complex action chloride of phosphorus shows with hyposulphite of lead.

MONTREAL

Natural History Society, April 25.—The Rev. Dr. DeSola presiding. Dr. Smallwood read the first paper, "On some phenomena of the Solar Eclipse of August 1869." It was intended to illustrate more fully a paper which he had contributed to the *Canadian Naturalist*, referring to the rose-coloured prominences of the sun's chromosphere, and their appearance before first contact. He exhibited diagrams of the several eclipses of 1851, 1860, 1868, and 1869, which showed the various shapes of the protuberance, and referred more particularly to the large one observed during the eclipse of last August, some 30,000 miles high, which was seen in a direct line with the passage of the moon across the sun's disc. He attributed the appearances which were observable a few seconds before the first contact of the Moon with the Sun's true limb to this circumstance, and cited and illustrated the experiments of Mr. J. N. Lockyer and Janssen, in confirmation of this opinion. The remarks of the Astronomer Royal, on the causes which, up to 1861, had prevented these prominences being seen, except during a solar eclipse, were quoted from the Transactions of the British Association. The spectroscope and other optical appliances have now made it possible to examine these phenomena at any time when the sun is shining. The experiments of Lockyer and Janssen seem fully to bear out the conclusions to which Dr. Smallwood had arrived, and the lecturer ended by expressing a hope that observations made on the eclipse of next December would tend to illustrate further the somewhat unusual appearances which he had recorded.—The Acting President made some remarks on the above paper, and expressed his regret at the want of good astronomical instruments in the city.—Mr. A. S. Ritchie then read a paper entitled "Aquaria Studies, No. 1." After some preliminary remarks, the principles upon which a fresh-water aquarium should be constructed and stocked were explained in detail, and particulars were given as to how the balance between animal and vegetable life might be best maintained. The author went on to describe some of the peculiarities of the larger tenants of his own aquarium. Commencing with the fishes, the various points of interest connected with the habits of several of the smaller Canadian fresh-water fishes were dwelt upon at some length. The species described were a new Stickleback, lately described by Principal Dawson in the pages of the *Canadian Naturalist*; the Darter, a fish which has no air-bladder, and swims by jerks; the Striped Minnow, the Sun-fish, American Perch, Black Bass, Cat-fish, Pond-sucker, the Black Minnow, a species allied to the Pike; and, although not a Canadian species, the Gold-fish. Illustrations were also given of the behaviour in captivity of the Painted Turtle, the Water Newt, the Shad Frog, and the American Crayfish. In conclusion the lecturer stated that in part No. 2 of Aquaria Studies, he hoped to give descriptions of the microscopical denizens of his miniature pond.

DIARY

THURSDAY, MAY 26.

SOCIETY OF ANTIQUARIES, at 8.30.—Election of Fellows.
ZOOLOGICAL SOCIETY, at 8.30.—On Dinornis (Part XVI.), containing Notices of Internal Organs of some Species, with a Description of the Brain and some Nerves and Muscles of the Head of the Apteryx australis: Professor Owen, F.R.S.—Notes on the Anatomy of the Prongbuck (Antilocapra americana): Dr. J. Murie.—Some Remarks on the Poison Glands of the Genus Callophis: Dr. A. B. Meyer.—Notes on some Fishes from the Western Coast of India: Surgeon Francis Day.
ROYAL INSTITUTION, at 3.—Electricity: Prof. Tyndall.

FRIDAY, MAY 27.

ROYAL INSTITUTION, at 8.—Primitive Vegetation of the Earth: Principal Dawson.
QUEKETT MICROSCOPICAL SOCIETY, at 8.

SATURDAY, MAY 28.

ROYAL INSTITUTION, at 3.—Comets: Prof. Grant.

MONDAY, MAY 30.

LONDON INSTITUTION, at 4.—Botany: Prof. Bentley.

TUESDAY, MAY 31.

ANTHROPOLOGICAL SOCIETY, at 8.—On the Armenians of Southern India: Dr. John Shortt.—The Races of Morocco: J. Stirling, M.A.
ROYAL INSTITUTION, at 3.—Present English History: Prof. Seeley.

WEDNESDAY, JUNE 1.

ETHNOLOGICAL SOCIETY, at 8.30 (at the Royal United Service Institution, Whitehall Yard).—Report on the Prehistoric Antiquities of Dartmoor: C. Spence Bate.

THURSDAY, JUNE 2.

ROYAL SOCIETY, at 8.30.
SOCIETY OF ANTIQUARIES, at 8.30.
CHEMICAL SOCIETY, at 8.—On the Platinum Ammonias: Dr. Odling.
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